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Syncope as the First Sign of Complete Heart Block in a Military Aviator

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Introduction: Syncope in an aviator may lead to abrupt loss or impairment of control of an aircraft and is thus a threat to safety of flight. Consequently, it is vital to conduct a thorough medical evaluation of any syncopal episode in a pilot or other flight crewmember. **Case Presentation:** A 28-yr-old male Naval Flight Officer experienced loss of consciousness at a morning briefing, but immediately returned to normal except for tachycardia. He suffered a second episode at a base hospital while on a cardiac monitor. The rhythm was diagnosed as complete heart block and a permanent pacemaker was inserted. This condition is considered disqualifying for U.S. Navy aviation duty. **Conclusion:** It is easy to dismiss a single episode of syncope in this age group as due to orthostasis, hangover, or other benign causes. Serious underlying pathology such as complete heart block is rare. The threat to safety of flight, however, dictates that all episodes of syncope in aviators receive a thorough diagnostic work-up.

Keywords: syncope, atrioventricular block, aviation medicine, military medicine, naval aviation.

SUDDEN INCAPACITATION, defined as an abrupt loss or impairment of consciousness, control, or performance is a key occupational concern in aviation medicine (4). Because syncope in the aviation environment can be very difficult to assess, Sharma et al. proposed an algorithm for evaluation and disposition of a single episode of loss of consciousness in an aviator (7). We report here the occurrence of sudden loss of consciousness in an apparently healthy Naval Flight Officer.

CASER EPORT

A 28-yr-old Caucasian male Naval Flight Officer collapsed soon after standing to leave a morning briefing at a military base. He fell prone and colleagues observed him to be unconscious for about 30 s. Blood was noted around abrasions of his right forehead and cheek and a small laceration of his left upper eyelid, all in the distribution of his eye glasses. Upon regaining consciousness, he was instantly alert and oriented. A Naval Flight Surgeon who was present determined that the patient's pulse was tachycardic but other vital signs were normal. The patient admitted to drinking a large amount of alcohol the previous evening through the early morning hours. He felt his lightheadedness was likely due to being dehydrated and hung over, and therefore initially resisted going to the Emergency Room. After discussion with medical personnel on scene, however, it was decided to transport the patient to the base hospital.

At the Emergency Department, the patient's initial pulse was 112; other vital signs were within normal limits.

He was a nonsmoker, was taking no medications, and had no known individual or family history of cardiac disease. Physical examination revealed an anxious Caucasian man with a systolic murmur, grade two on a scale of six. Heart monitoring was initiated, an ECG was recorded, and intravenous fluids were given. Laboratory values for electrolyte levels, blood count, and coagulation studies were within normal limits and non-contrast CT of the head was normal. During his stay in the Emergency Department, the patient had a second episode of syncope: a nurse reported that the patient looked at him, said, "I don't feel good," and then lost consciousness. Suctioning was immediately performed to assure a clear airway. No pulse was detectable, but before CPR could be initiated, the patient returned to consciousness and was alert with airway intact. A cardiac rhythm strip during the episode showed complete heart block followed by complete sinus arrest lasting nearly 1 min before spontaneous return to sinus bradycardia. IV dopamine was initiated while preparations were made to transfer the patient to a nearby civilian hospital for a more thorough cardiac work-up. Throughout the evaluation, the patient denied past or current chest pain, shortness of breath, orthopnea, or paroxysmal nocturnal dyspnea.

A cardiology consultant interpreted the ECG prior to the second syncopal episode as sinus tachycardia with nonspecific ST-T changes. The calculated corrected QT interval was 415 ms. The record of the syncopal episode revealed initial sinus rhythm with subsequent development of a high-grade atrioventricular (AV) block with no ventricular conduction or repolarization. It was noted that suctioning of the airway may have prolonged this event, as associated vagal stimulation can cause bradycardia and may potentiate dysrhythmias (5).

A civilian cardiologist strongly advised insertion of a permanent pacemaker in this patient to prevent further episodes with their associated risk of physical injury. In

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addition to information about the risks and benefits of the procedure itself, the patient was informed that, according to Navy aeromedical policy, third degree AV block is disqualifying due to the risk of bradycardia with decreased $+G_z$ tolerance, syncope, or sudden death, and that pacing is incompatible with active flying status (1). FAA policy affirms that a permanent cardiac pacemaker is considered disqualifying. Civilians with this condition, however, may be evaluated on a case-by-case basis, and special issuance medical certification waivers have been granted to all classes of airmen (6).

An echocardiogram was performed the next morning. The heart was found to be grossly normal with an ejection fraction of 69%. That afternoon, a dual-chamber pacemaker was successfully inserted in the left subclavian area. No complications were encountered, and the subsequent chest x-ray showed intact pacer leads. The patient was discharged to follow-up with his Flight Surgeon.

DISCUSSION

Very few cases of complete heart block in young aviators have been described in the literature. Furthermore, cases of this type are often attributed to benign causes such as vasovagal syncope, orthostasis, or hangover, and diagnostic evaluation may not be considered. Indeed, discussion with the patient later elicited several other examples of syncope in the patient's past, all of which had been accounted for by such causes with no apparent need for further medical work-up.

Third degree or complete AV block is an interruption of the transmission of an impulse from the atria to the ventricles such that no atrial impulses reach the ventricle. It is caused by an anatomical or functional impairment of the conduction system and the conduction disturbance can be transient or permanent. Complete heart block accompanied by a slow pacemaker or asystole can result in a variety of potentially serious symptoms, including dizziness, presyncope, and syncope, and may lead to sudden incapacitation or death. Whereas the most common etiologies are fibrosis and sclerosis of the conduction system and ischemic heart disease, other etiologies include drugs and increased vagal tone (2). AV block is diagnosed by ECG and heart monitoring, one of the cornerstones of diagnosis in the evaluation

of syncope (9). Although conduction system disturbances are rare in this age group, symptomatic pauses of any mechanism suggest disqualification from flying duties (8). Current official guidelines recommend placement of a permanent pacemaker in patients with complete AV block (3). All patients with associated symptoms, ventricular pauses ≥ 3 s, or a resting heart rate < 40 bpm while awake have a class I, or necessary, indication.

In conclusion, this case reveals the importance of referring all cases of syncope in aviators for further medical evaluation. It is vital to rule out underlying conditions that may lead to further episodes and, if occurring in flight, could lead to an aviation mishap.

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